

came to about the middle of it, they found some of the Hay to be burnt, some part clear Ashes, and a Globe of Vitrified Matter; but he added, that the Fire was quenched, as he supposed, for want of Air.

IV. *An Account of Insects in the Barks of decaying Elms and Ashes. In a Letter from Sir Matthew Dudley, Knight, F. R. S.*

Clapton in Northamptonshire, October, 15. 1704

ABout 5 or 6 years since, I removed divers Elms, more than six inches Diameter, which for the first two or three years all thrived very well; but two or three years ago there happening a very dry time in *July* or *August*, I observed one of those Elms, which stood very shallow, and on pretty high ground, looked very sick; the Leaves turned yellow, and began to fall off; which made me with a Knife examine the Bark. I found the inside thereof not so green, but of a more reddish colour than the others; and between it and the Tree not so moist, and the Bark sticking very close to the Wood: But what was most remarkable, I discerned a great many little black Flies of the Beetle kind (*viz.* having a hard Case, under which their thin long Wings were contracted, and therewith covered) between the Bark and the Tree: And looking more carefully, I observed these Flies had made their way thither by piercing the Bark in innumerable places, easily discernable on the outside and was about the bigness of a large Pin hole, or rather such as a large Pins head would go into; some I found

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just entring, who had not got quite through the Bark, others had made some progress between the Tree and the Bark, which appeared as a Channel. I despaired of recovering the Tree ; however, my Servants being Watering others, I caused them to bestow about two Hog-sheads on this Tree, with stirring the Earth about the Roots, and laying some half rotten Litter thereon, to defend it from the scorching Rays of the Sun : Upon this the Tree in some manner recovered its Verdure again that year, and the next year made very good Shoots, and so continued until this year.

But this being a very dry Summer, I discern'd divers of my Trees in the beginning of *August* to look sick, and particularly the Tree formerly mentioned ; I made the same tryal on them all, and found the Bark sticking close to the Tree, with but little moisture between, and vast numbers of those little Flyes, who had pierced the Bark in multitudes of places. I ordered the Earth about the Roots to be loosened as formerly, and about two Hog-sheads of Water to be poured on each, and viewing them the next morning, I found the outside of the Tree almost covered with Bees and Walps, and great black Flyes, such as they usually call Flesh-flyes ; who were all busie in sucking the Juice or Sap, which plentifully run out at every hole, that the little Flyes formerly mentioned had made in the Bark, and which was very Glutinous, and sweet as Honey. I again examined the Bark, and found it very moist between it and the Wood, and all those little Flyes either gone, or drown'd in their new habitation, by the sudden rise of the Sap ; this Tree recovered.

Upon Examination of several Trees, which looked sicker than the rest, I found almost all greenness had left the Bark, and there remained no moisture between it and the Wood ; but the Bark stuck so close to the Wood it was hardly to be parted : And throughout the whole

Tree

Tree the Bark was pierced by the aforementioned little Flyes, who from the hole at which they entred, had made each of them a strait perpendicular Channel from their entrance upwards, about two inches long, or something more, very little, if at all, bigger than just to move themselves strait forwards in ; for I observed they all of them, if disturbed, came out backwards. All along on each side this Channel, as close the one to the other as they well could, so as yet to be distinct, there were small Channels running Horizontally from it, in every one of which at the extremity thereof there was a Maggot, in size just the bigness of the small Channel, very lively, whitish, and almost transparent. These Trees, tho well Watered, received no benefit thereby, but dyed.

It is to be observed, that in those Trees whose Leaves looked Green and Healthful, there was none of these Flyes to be found.

The Reason of which I presume to be, that whilst there was a sufficient Moisture in the Earth about the Roots, to supply the Tree with a due quantity of Sap, so thin and diluted that it was proper, and capable of being conveyed into the smallest Twigs and Leaf-vessels, the Leaves kept their Verdure, and the Tree flourished : But when, by reason of the dry season, that supply failed, and the Sun perpetually exhaling the thinnest and more watry parts thereof through the Bark, the Sap already in the Tree became insufficient in quantity, as well as improper, by reason of its thickness, to supply or enter into all those small Vessels. The Leaves lost their Greenness, and fell off, and the Sap became thick and very sweet, (which I have found it is not when it is duly diluted, and the Tree in good health ;) this invited those Flyes to make their way to it, as a proper Nursery to bring up their young ones ; which I take those little Maggots to be. I presume also, that the Eggs were first laid in the

great Channel, (and, it may be, regularly placed at their due distances, in the sides thereof) and after being hatched, made those small Channels themselves; since those small Channels are no way capable of receiving the Old Fly, and that the Maggot is always found at the farther end of the little Channel, and the rest of the little Channel is perfectly filled with very small Particles, which, when dry, became fine Dust; and I conceive to be either the Excrements of the Worm, or parts of the Bark ground small by the Teeth of the Worm, to make its way forwards, and rejected as not proper Aliment, or both.

About the middle of *October* I found those little white Maggots, and consequently their Channels, which they exactly filled, were grown much bigger, and had made their progress from the place where they were first hatched, which was close to, or upon the very Wood of the Tree, almost to the very outside of the Bark of the Elm, which is usually pretty thick; and in every one of those Perpendicular Channels before mentioned, I found the Mother Fly lying dead, for the most part towards the entrance of the said Channel.

These Observations put me upon viewing the Wood, which lay in my Yard for Timber or Fuel, and in all the Elm which was felled last Spring, I found the Bark thereof as much pierced; the same Mother Channel, which for distinction sake, I beg leave still, tho improperly, to call Perpendicular (for these Trees lay on the Ground) and the same little (now as improperly called Horizontal) Channel proceeding from the Mother Channels full of Maggots, which Maggots had also made their way almost to the outside of the Bark.

Observing some Elm, which had lain much longer in the Yard, and taking off the Bark, I found the same tracks both of Mother Fly and Maggots; and that at the extremities of almost all the Horizontal Channels made by the
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Maggots ; where they had subsisted long enough to come to any perfection the Bark was pierced quite through, by a hole just the bigness of the Channel, and nothing left remainin But a sort of a whitish pretty tough Skin, exactly the colour and size of the Maggot, at the mouth or the hole and the rest of the forsaken Channel perfectly filled with what I formerly presum'd to call the Excrement of the Maggot.

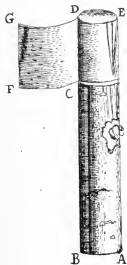
Then I examined the Ash-wood, which had lain some time in the Yard, and at first sight, it being young, and its Bark pretty smooth, I perceived it full of small holes ; and on separating it from the Tree, I found just the same sort of work as in the Elm, and by the same sort of Fly, having found several of the Mother Flyes dead in their Channels, and the same empty Skins at the extremities of the other Channels ; only with this difference, that whereas in the Elm all the Mother Channels were Perpendicular, and the Maggot Channels Horizontal, here in the Ash it was just contrary, all the Mother Channels were Horizontal, and the Maggot Channels Perpendicular ; this I at first thought might be accidental, and peculiar to that piece of Wood, but on examination of above 100 pieces of Wood of different Trees, and felled at different times, I found it exactly to hold true in them all.

I observed several Oak and Maple Trees, which had been felled some in Winter and some in Summer, and the Bark remaining thereon, but could find no such thing in either of them.

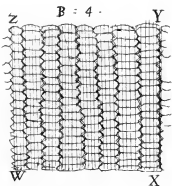
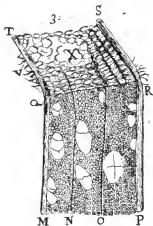
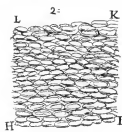
Explanation of the Figures in Tab. 2.

Fig. 1. *shews the Bark of Ash.* Fig. 2. *The Bark of Elm.*
Fig. 3. *The Worm as big as the Life lying on its Back.* Fig. 4.
The Mother Fly, with its Belly upwards, as big as the Life.
Fig. 5. & 6. *The Worm and the Fly with their Backs upward.*
Fig. 7. & 9. *The Worm Magnify'd.* Fig. 8. *The Mother Fly Magnify'd.*

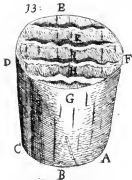
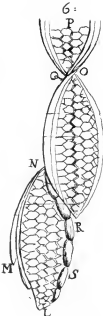
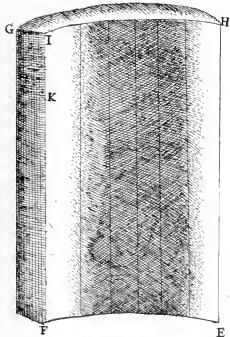
Fig. 1.



Tab = I.



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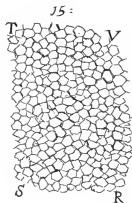
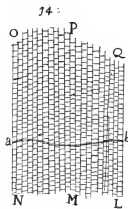
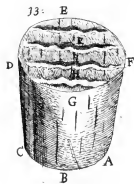
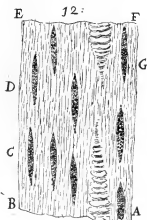
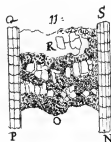
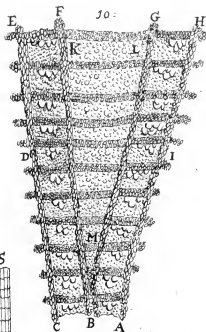
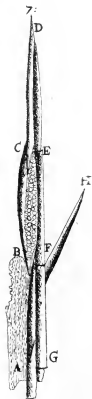
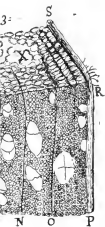


Fig-1.

Tab-2.

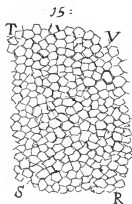
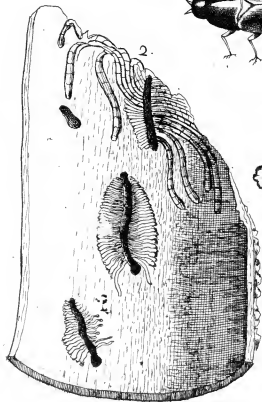
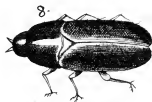
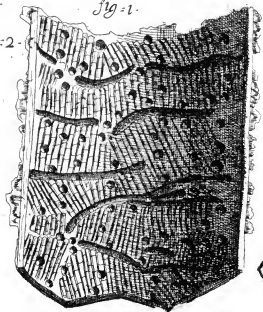
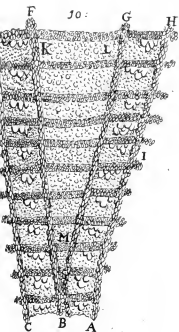


Fig. 1
Fig. 2
Fig. 3
Fig. 4

